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DISEASES OF THE NERVOUS SYSTEM

A PRACTICAL JOURNAL ON PSYCHIATRY AND NEUROLOGY

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DISEASES of the NERVOUS SYSTEM

(PUBLISHED MONTHLY)

A PRACTICAL JOURNAL ON PSYCHIATRY AND NEUROLOGY

EDITORIAL COMMENT

Progress in Control of Chronic Alcoholism

Science has made much progress during this past century toward controlling conditions which interfere with the health and happiness of our race. Many of the ravaging physical disorders have been abolished almost completely through preventive medicine. Recently, an increasing social consciousness has turned the attention of scientists to other public health measures not related primarily to physical disease. Some of these have been mentioned in previous editorials of the journal, and now the editor wishes to call attention to a very important as well as a very old problem—over-indulgence in alcohol.

During the past years some effort has been made to solve the difficulty, but this has been done by individual groups of laymen, lawmakers or physicians who either had fixed ideas for complete prohibition, supervised control, etc., or who were interested chiefly in the control and treatment of the so-called "drunkard". Naturally, little was accomplished because their plans were based on beliefs instead of a thorough understanding of the whole problem, and of perhaps greatest significance, an entire lack of coordination of their efforts. To certain members of the American Association for the Advancement of Science it became evident that a complete understanding of the whole problem of alcoholism would be necessary, so they formed a united group to conduct research and exchange ideas. Thus, in early 1938 the Research Council on Problems of Alcohol was created, and to succeed meant the collaboration of persons in every field of science, education, business and government. Their purpose—"To ascertain the facts . . . to make these facts available to the public in such a way that they will do the most good"—needed a planned course of study of great thoroughness, and some account of this work has been published in the journal edited by the council called "Quarterly Journal of Studies in Alcohol."

In December, 1940, the Research Council on Problems of Alcohol held a symposium where further contributions to our knowledge of the uses and abuses of alcohol were given by men of medicine and associated sciences, and also from the other professions that deal actively with the welfare of man. Though no conclusions were drawn and much work is ahead, it is well to consider the summary of that meeting which is to be published in Mental Hygiene, Vol. 25, No. 2, April, 1941, for it contains a fact-finding review which more than covers the present conception of chronic alcoholism held by the medical profession.

Pointing out that alcohol is a drug whose abuse may lead to disease with both medical and social implications, yet they show that the cultural attitude which condones drinking for social usage has in a measure been responsible for the chronic alcoholic; however, conditioning factors must also exist, such as misdirected emotional drives, physical conditions or abnormal reactions to alcohol, to cause these individuals to take it to excess.

Such alcoholic over-indulgence, for in-

(Continued to page 142)

The Effects of Cold on Mental Disorders

A Study of Ten Patients Suffering from Schizophrenia and Treated with Hypothermia*

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We have become accustomed in recent years to think of the treatment of mental disorders in terms of procedures which produce profound alterations of the internal environment of the body. Insulin and metrazol therapy are examples which have contributed to the establishment of an unequivocal precedent. Both are classified as shock treatments, in part at least, because they are accompanied by demonstrable morphologic changes in the central nervous system, as well as in other parts of the body. Fever therapy, inhalation of various gaseous mixtures, narcosis and "total push" are other procedures useful in the treatment of mental disorders which are not accompanied regularly by alteration of the anatomic structure of the body. The work described in the present communication concerns the application of another form of treatment to mentally sick patients. The treatment is accompanied by profound alteration of the internal environment of the body, but belongs in the second category because irreparable morphologic damage is not an integral part of the procedure.

The paper reports certain changes in the clinical course of ten patients suffering from frank schizophrenia who were treated by a general lowering of the body temperature. Although the communication is concerned principally with a discussion of our therapeutic findings, we were originally attracted to the problem by a desire to collect physiologic observations on subjects undergoing a marked lowering of the body temperature. Obviously, the fundamental observation of Fay and Smith[1] that the temperature of the human body could be lowered from 10° to 20° F. below normal with subsequent recovery, in conjunction with our interest during the past decade in the effects of high temperature,[2-3] were the essential ingredients of this desire.

Subjects

The patients studied, with but one exception (S. R.), had been mentally sick for one or more years and had been hospitalized for 6 months or longer. A diagnosis of schizophrenia was confirmed in each patient by 5 or more psychiatrists. As precisely as one could determine, each patient was essentially normal physically. Although two patients had lost weight since their illness began, none of them were believed to be suffering from any serious disease of the heart, lungs, gastrointestinal tract, liver, kidneys, blood vessels, etc. Routine urine and blood examinations were negative. Several had had electrocardiograms taken within 2 years; all of which were interpreted as normal tracings. The fact that these patients were outwardly normal except for the mental disorder, was our original reason for using them as subjects in the low temperature studies.

Nomenclature

A few words about nomenclature may be appropriate. Since the treatment described herein is associated with a general lowering of the body temperature, from 10° to 20° F. below normal, the terms freezing, frozen sleep, refrigeration and hibernation have

* This study was aided by a generous grant from the Lucius N. Littauer Foundation. The activities of the medical research laboratory, Massachusetts General Hospital, are supported in part by the Corn Industries Research Foundation.

been used by the lay and medical press to describe the process. We believe them to be misnomers, however, and their choice unfortunate. During the treatment no tissue of the body is frozen or even temporarily devitalized. We object to the word refrigeration because it implies that the object treated is refrigerated and that the temperature is reduced considerably lower than is compatible with life. Hibernation has been used to describe the process, but it is questionable whether the physiological changes in animals during hibernation[4] are duplicated by humans with the current technique. It is believed that the nomenclature will be more accurate if the term *hypothermia* is used. One could refer then to general hypothermia, that is, a general lowering of the body temperature, or local hypothermia, for local application of cold.

Historical

Although the use of prolonged general hypothermia in the treatment of mental disorder is recent, the application of cold to the body of mentally disturbed patients undoubtedly is centuries old. In the English literature of nearly 150 years ago,[5] there is a clear cut description of a young man afflicted with insanity who was treated as follows: "having in mind the success of the cold bath in convulsive diseases, I ordered it to be tried on the present occasion. The insanity returned with great violence on the twenty-first, he was thrown headlong into the cold bath. He came out calm and nearly rational, and this interval of reason continued for twenty-four hours. The same practice was directed to be repeated as often as the state of insanity occurred.

"The direction has been followed and on the morning of the twenty-third, he was thrown again into the cold water bath in the height of his fury as before. As he came out, he was thrown in again, and this was repeated five different times, till he could not leave the bath without assistance. He became perfectly calm and rational in the bath and has remained so ever since.

"In order however to the success of the cold bath, either in mania or convulsion, it will be readily perceived, that it is necessary that no considerable laesion of the structure shall have taken place, and that the morbid actions be not so strong as to produce insensibility to impression, and shall not have been so often repeated as to form indissoluable associations. Finally, it is necessary that the digestion shall not have been much impaired, or the vigor of the circulation much debilitated, lest the action of the cold be too strong for the living process."

The latter statement shows considerable insight into the physiological and pathological effect of cold on the human organism.

Sometime after this clinical observation, Mares and Hellich[6] produced a fall in temperature of 7° F. in an hysterical woman by means of hypnosis. Recently, the subject of hypothermia and mental disorders has been investigated from a slightly different aspect. It is probable that patients with schizophrenia have a heat regulatory apparatus which operates at a lower level of temperature than normal.[7-8] We can not confirm, however, the statement of Gottlieb and Linder[9] that schizophrenic patients have their homoiothermic stability replaced by a lower phylogenic type of adjustment which resembles poikilothermia.

Procedure

The methods employed for the induction of hypothermia were quite similar to those recommended by Fay.[10] Approximately 20 minutes before cold induction, 0.25 gm. of nembutal was given intramuscularly. From 0.4 to 0.6 gm. of evipal was given, intravenously, immediately before the patient was placed between a pair of blankets* through which a refrigerant at a temperature of 32° F. or less was circulating. As the anesthetic effect of evipal and the sedative effect of nembutal wore off, the body temperature began to decrease under the influence of the cold. Simultaneously, the anesthetic and sedative effect of the cold began to operate. "That cold in extreme degrees is a powerful and effective sedative" was apparent as early as 1805.[5]

No subsequent medication except the external cold was needed for most patients. It was hoped thereby to collect observations on the pure effect of hypothermia uncomplicated by drugs. This was believed to have been

* Blankets adapted for a continuous flow of refrigerant are manufactured by the Thermo-O-Rite Products Co., Buffalo, N. Y.

Many were gathered before and after treatment as well as at several times during treatment. They include: metabolic rate; red and white blood cell counts; circulation time; blood and interstitial fluid volumes; concentration in arterial blood of oxygen, carbon dioxide, hemoglobin, total base, sodium, potassium, calcium, magnesium, chloride, protein, phosphate, lactate, nonprotein nitrogen, and sugar; concentrations in the urine of total base, sodium, potassium, calcium, magnesium, chloride, phosphate, creatinine and creatine, total nitrogen, 17-ketosteroids, and albumin; clearance by the kidneys of inulin, achieved. A stomach tube was inserted shortly after induction and measured amounts of 5 per cent glucose in normal saline solution were instilled periodically. A rectal thermocouple* with a continuously recording device enables one to know the body temperature every second minute throughout the treatment. On the odd minute the blanket temperature is recorded.

A comprehensive series of physiological observations on the patients were collected. creatinine, diodrast, sodium, potassium, urate and chloride; electrocardiogram; x-ray of the heart; skin temperature; electroencephalogram; and electromyogram. Most of the experimental observations will not be referred to again in this communication, but will be reported elsewhere.

Our first experience was very much of a trial procedure and patient B. R. was under treatment for only 9 hours and her minimum body temperature did not fall below 87° F. The other patients (Table I) were subjected to hypothermia for a minimum of 24 hours and the body temperatures were reduced below 85° F. in each treatment save one. Sixty-eight hours was the longest the temperature remained below normal. 74.6° F. (Figure I) was the lowest the body temperature observed. It may be stressed that our treatments were of relatively long duration, i.e., 24 hours or more, and most likely evoked a different response than would have been present had they been conducted for a shorter period.

Abstracts of Clinical Records

Case 1—B. R., a single woman aged 41, had had symptoms of mental disease for more than 20 years. She was admitted to McLean

* A continuously recording instrument (Micromax) is manufactured by Leeds & Northrup, Philadelphia, Pa.

TABLE I

Experimental Observations During Hypothermia

Patient	*Date 1940*	*Hours with rectal temperature below 98° F.*	*Minimum rectal temperature during treatment ° F.*
B. R.	May 29	9	87.0
H. M.	June 6	25	74.6
S. E.	June 12	38	75.0
	October 12	29	84.2
	November 9	54	86.8
W. D.	June 19	50	80.0
S. J.	June 26	30	77.6
	October 20	32	82.0
H. A	July 2	38	85.0
	October 5	24	87.0
	November 2	60	81.5
S. R.	July 10	27	92.0
H. I.	July 17	33	84.5
	October 26	68	81.0
P. M.	July 22	31	83.6
M. F.	July 29	29	83.0

Hospital in 1921 and has been a patient in that institution during most of the intervening years. A diagnosis of hebephrenic schizophrenia was made in 1934. On May 29, 1940, hypothermia was instituted. Her temperature remained below 98° F. for 9 hours and below 95° F. for 7 hours. It reached a minimum of 87° F. No significant change in her mental state followed this treatment.

Case 2—H. M., a married woman aged 39, had had symptoms of mental disease for more than 10 years. A diagnosis of paranoid schizophrenia was made in May 1938. She was a patient at McLean Hospital from November 1939 to August 1940. She received 4 injections of metrazol in January 1940 with slight improvement. After 2 injections in February she appeared to be worse. They were discontinued thereafter. On June 6, 1940, general hypothermia was instituted (Fig. I). Her temperature remained below 98° F. for 25 hours, below 95° F. for 20 hours and reached a minimum of 74.6° F. Following the treatment, she was less agressive for a few days, but at the end of the week, she was essentially unchanged from the pre-treatment state.

Case 3—S. E., a single woman aged 29, had

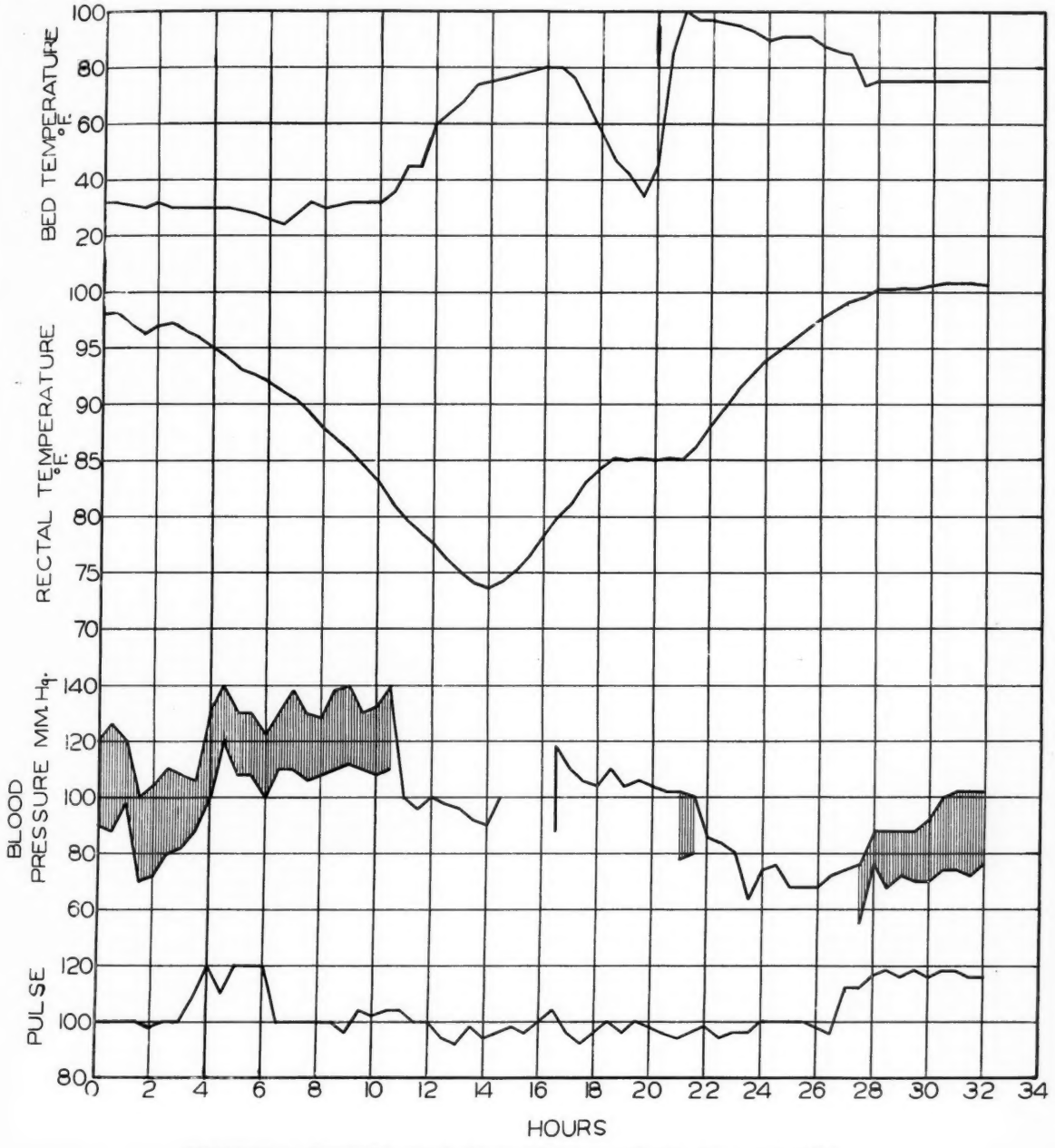

FIGURE I. Experimental observations on H. M., June 6-7, 1940.

had symptoms of mental disease for more than 4 years. She was first admitted to McLean Hospital in January 1937, and has been in a mental hospital most of the intervening time. A diagnosis of hebephrenic schizophrenia was made in 1937. In the fall of 1938 she received two series of insulin shock treatments. Temporary improvement, only, resulted. On June 12, 1940, hypothermia was instituted. Her temperature remained below 98° F. for 38 hours, below 95° F. for 34 hours, and below 80° F. for 7 hours (Figure II). It reached a minimum of 75° F. During the twenty-four hours after the treatment she was drowsy and uncooperative. A two-day period then ensued when she became cooperative, mentally clear and displayed a considerable degree of normal responsiveness. She stated that she was aware that she had been confused for some time and showed a surprising degree of insight into her trouble. All who saw her believed she was better than she had been for more than 2 years. She reverted to her former state, thereafter.

On October 12, a second treatment was begun. At this time, her temperature remained below 98° F. for 29 hours, below 95° F. for 26 hours, and reached a minimum of 84.2° F. No demonstrable change in her clinical course followed this treatment.

On November 9, 1940, a third treatment was begun. Her temperature remained below 98° F. for 54 hours, below 95° F. for 49 hours and reached a minimum of 86.8° F. Improvement in her mental state was evident 12 hours after the end of the treatment. She was mentally alert, oriented, and able to converse normally. She continued somewhat suspicious for 3 days and thereafter maintained a more responsive and cooperative personality than before treatment. Partial contact with reality was sustained and has persisted up to the present.

Case 4—W. D., a married male aged 46, had suffered from mental disease for approximately 10 years. He was admitted first

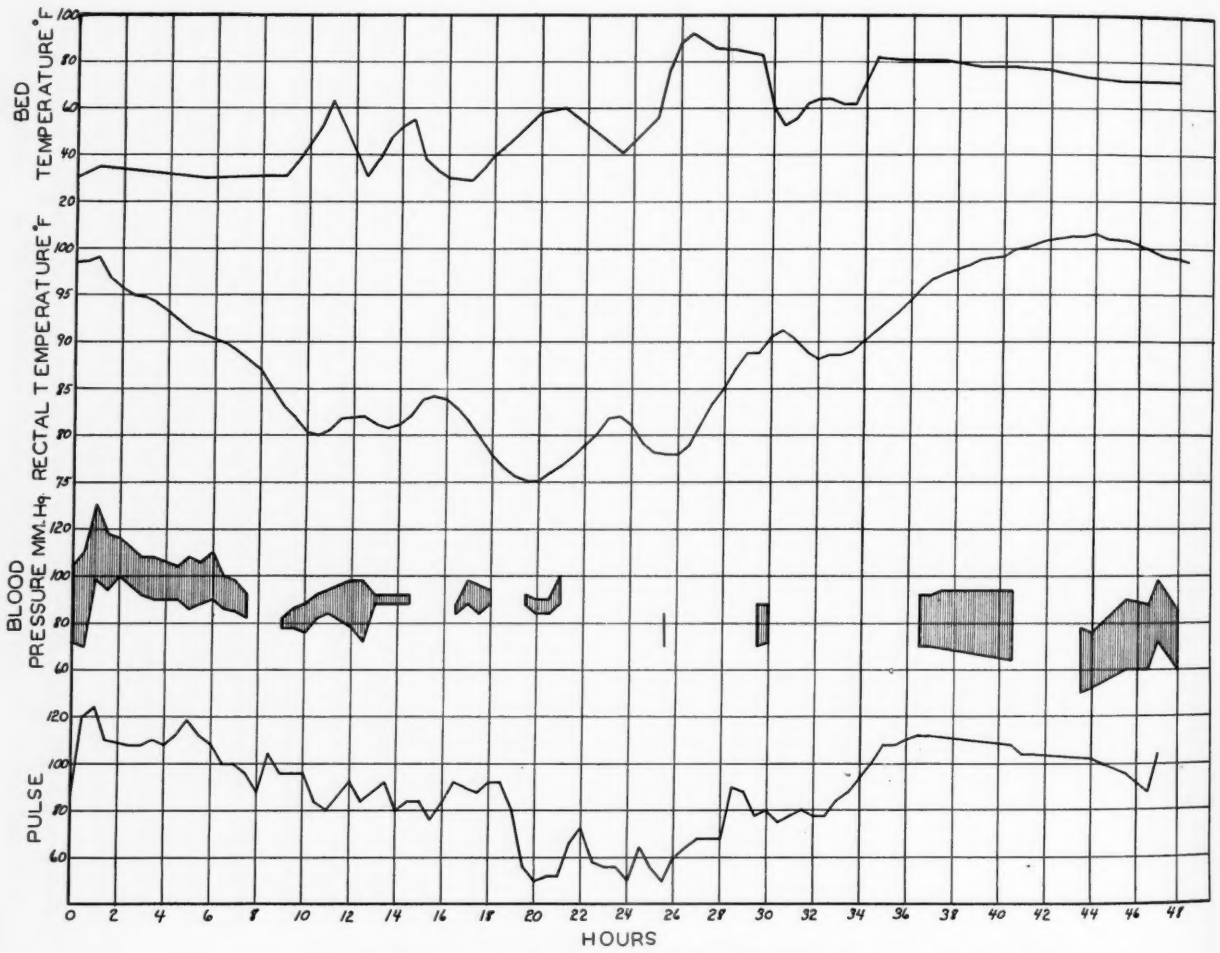

FIGURE II. Experimental observations on S. E., June 12-13, 1940.

to McLean Hospital in 1931. The greater part of the intervening time has been spent in that hospital. A diagnosis of paranoid schizophrenia was made in 1934. He was given 3 shock treatments with insulin. Following these his mental condition became decidedly worse. Hypothermia was instituted on June 19, 1940. His temperature remained below 98° F. for 50 hours, below 95° F. for 45 hours and reached a minimum of 80° F. When the temperature was 92° F. and on the return toward normal, circulatory collapse developed. He died shortly afterward. This was the only death in our series of patients with schizophrenia. With the total experience gained from this and other patients it is believed that the death was preventable. As the temperature was allowed to return toward normal, the blood pressure dropped as it did with all patients. When the blood pressure was low, through an error in orders, heat was applied to the patient's skin. It is assumed that such a procedure is contraindicated and further expands the peripheral vascular bed which is expanding at a slightly greater rate than the blood volume. In this patient, subcutaneous injections of adrenalin, caffein, and sodium benzoate and nasal oxygen were of no avail. An autopsy was obtained. It is planned to report this in detail elsewhere.

Case 5—S. J., a single woman of 23, had had symptoms of mental disease since October 1939. She was admitted to the McLean Hospital in January 1940 and a diagnosis of catatonic schizophrenia was made. She was thoroughly unmanageable until hypothermia was instituted on June 26, 1940. Her temperature remained below 98° F. for 30 hours, below 95° F. for 23 hours and reached a minimum of 77.6° F. During the first month after treatment she showed slight improvement. In August and September she improved rapidly. On October 20, 1940 she was given a second treatment with hypothermia. Her temperature remained below 98° F. for 32 hours, below 95° F. for 21 hours and reached a minimum of 82° F. Continued improvement followed. She became very cooperative and has maintained a satisfactory contact with her environment. There has been no evidence of regression.

Case 6—H. A., a single woman aged 25, had had symptoms of mental disease for approximately 4 years. During this period she has spent most of her time in one of several hospitals. A diagnosis of catatonic schizophrenia was made late in 1936. Before her present hospital admission she had received dauer narcosis, insulin shock, metrazol, and typhoid vaccine therapy. Following each of these she had shown some temporary improvement. She was admitted to McLean Hospital in March 1940. Hypothermia was first instituted on July 2, 1940. Her temperature remained below 98° F. for 28 hours, below 95° F. for 18 hours and reached a minimum of 85° F. After 14 hours of hypothermia she began to converse, at times coherently. As the temperature was allowed to return to normal and had reached approximately 89° F., she was sensible and rational during a constant stream of well-ordered and normal conversation. During this interlude, for the first time since her admission to McLean Hospital, she discussed some of her problems which undoubtedly have an important dynamic relationship to her illness. The clear period lasted more than 4 hours as the temperature rose slowly to 93° F. At this level she became disoriented, aggressive and uncooperative and subsequently mute and combative. During the 48 hours following the treatment as well as at times during the next 3 months she was slightly better. By and large, however, she showed only minimal general improvement.

Hypothermia was repeated October 5, 1940. The temperature remained below 98° F. for 24 hours, below 95° F. for 18 hours and reached a minimum of 87° F. After 17 hours of treatment she began to talk and conversed coherently. The temperature at that time was 88° F. Just as during the previous treatment, she was rational for approximately 5 hours until her temperature reached 94° F. Again she reverted as the temperature returned to normal and appeared to be as sick mentally as before the treatment.

Hypothermia was instituted a third time November 2, 1940. The temperature remained below 98° F. for 60 hours, below 95° F. for 56 hours, and reached a minimum of 81.5° F. (Figure III). Again she became mentally clear as her temperature reached 88° F. on the return toward normal. She remained clear for more than 5 hours and until the temperature reached 91° F. The temperature response

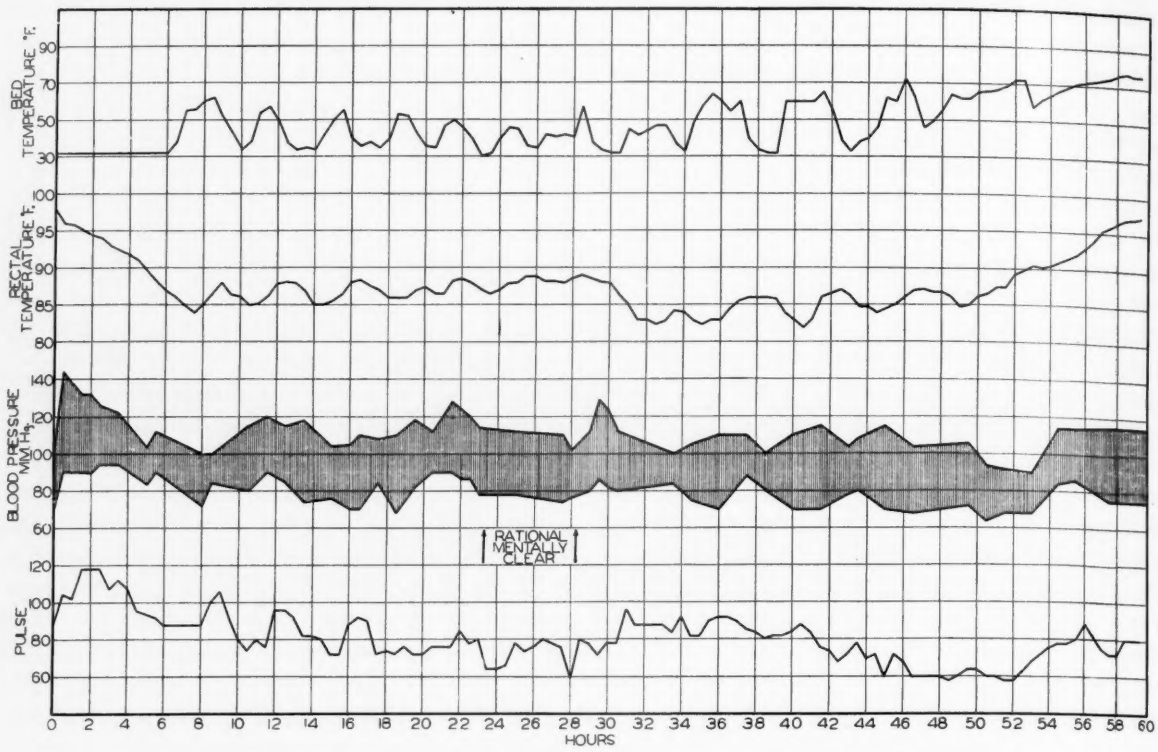

FIGURE III. Experimental observations on H. A., November 2-3, 1940.

was reversed at that level and was allowed to fall to 84° F. As it returned toward normal through the early 90's, 12 hours later, no change in her mental state was noted. In the following 2 days, she was slightly more cooperative on the ward. Seventy-two hours after the treatment, she became coherent, requested her clothes in order that she could be dressed and in general showed a striking improvement. The following week she spent a great deal of time in the library and on casual inspection appeared as a normal person. On psychiatric examination, however, she showed unmistakable symptoms of mental illness. At night she tended to revert to periods of confusion with the expression of queer ideas, untidiness with urine and feces, and overactivity in an elated and boisterous manner. Her cooperation and participation in a "total push" program including occupational therapy and physiotherapy plus a fairly adequate social adjustment have continued.

Case 7—S. R., a single male aged 16, had had symptoms of mental disease since early in April 1940. He was admitted to McLean Hospital one month later and a diagnosis of catatonic schizophrenia was made. He remained in the hospital until October 28, 1940. On July 10, 1940 hypothermia was instituted. The body temperature remained below 98° F. for 27 hours, below 95° F. for 6 hours and reached a minimum of 92° F. In the following 4 months his course was one of general improvement. Except for a few days in September when he behaved peculiarly, he has been quiet, polite and friendly. His hallucinations and queer ideas disappeared. He was allowed to go home the last of October because of continued improvement.

Case 8—H. I., a single woman aged 37, had had symptoms of mental disease since 1923. She has been a patient at McLean Hospital since 1932. A tentative diagnosis of schizophrenia was made in 1933. Confirmatory evidence appeared to substantiate this in 1937. In 1938 she received several insulin shock treatments with little change in her mental state. Hypothermia was instituted July 17, 1940. Her temperature remained below 98° F. for 33 hours, below 95° F. for 28 hours, and reached a minimum of 84.5° F. During the 5 days after treatment the patient improved markedly. She was pleasant, cooperative and appreciative of the things done for her. Revision to her pre-treatment state

ensued thereafter.

On October 26, 1940, hypothermia was instituted a second time. Her temperature remained below 98° F. for 68 hours, below 95° F. for 60 hours and reached a minimum of 81° F. During the return of the temperature toward normal and as it approached 90° F. she became mentally clear and carried on a lively conversation about many topics in a logical and coherent manner. This clear period lasted for approximately 6 hours and until her temperature reached 95° F. Within 24 hours after the treatment she became clear again and remained clear for 36 hours. During this time she gave every appearance of a normal and completely recovered individual. She wrote in longhand a letter to her mother and father. She was sociable, courteous in her attitude and an interesting conversationalist. Following the clear interval, she reverted to her previous psychotic state of mutism and extreme negativism.

Case 9—P. M., a single woman aged 38, had had symptoms of mental disease since 1932. A diagnosis of paranoid schizophrenia was made at that time. Her first admission to McLean Hospital was in 1934. A large part of the time since has been spent in that hospital. In 1938 and 1939 she received several insulin shock and metrazol treatments. Temporary improvement followed some, no change in the mental state was observed following others. On July 22, 1940 hypothermia was instituted. The temperature remained below 98° F. for 31 hours, below 95° F. for 28 hours and reached a minimum of 83.6° F. No change in her mental state followed this treatment.

Case 10—M. F., a single woman aged 25, had had symptoms of mental disease for more than 10 years. A diagnosis of paranoid schizophrenia was made in April 1939. Since that time she had been confined, intermittently, to McLean Hospital, where she had received several insulin shock and metrazol shock treatments. Neither form of therapy appeared to alter the course of the disease. On July 29, 1940 general hypothermia was instituted. Her temperature remained below 98° F. for 29 hours and below 95° F. for 22 hours. It reached a minimum of 83° F. The adjustment of this patient outside of the hospital had been unsatisfactory because of hallucinations and ideas of a bizarre delusional type. Following hypothermia she returned to her home and at the last follow-up report, 4 months later, it was apparent that she had made a good social recovery and a satisfactory social adjustment.

Discussion

The subject of hypothermia was introduced at the beginning of this paper by reference to several types of "shock" therapy. It should be reiterated, however, that hypothermia does not shock the patient as do large amounts of insulin or metrazol. We believe that hypothermia acts like an anesthetic and is closely allied to procedures such as deep narcosis or gradual anoxemia. Each is associated with a significant alteration of the internal environment of the body but if recovery ensues there is no irreparable morphologic damage. The same has never been claimed for insulin or metrazol. Further proof that hypothermia does not cause morphologic damage may be gathered from the autopsy studies of patients treated with hypothermia who were suffering from metastatic cancer and not from any mental disease, *per se*. No demonstrable changes in the central nervous system,[11] attributed to the diminution in body temperature, have been observed.

The ten patients described in this study were selected because of their failure to respond to other types of current psychiatric therapy, particularly insulin, metrazol, and "total push". The majority were negativistic, showing the aversion response to all social contacts and communications. Some were irritable, aggressive, impulsive and for the most part in extreme psychotic states, representing that seemingly insurmountable barrier between reality and unreality, in which fantasy and confusion seem to produce a mental state with extreme negativism and a struggle even against the factors fundamentally essential to the organism's life, such as, for example, the taking of food.

The therapeutic results may be divided into three types of responses: (a) a persistent and reassuring modification of the mental picture and reaction after the treatment, (b) a temporary or quasi-permanent change in the clinical course, (c) no modification of the mental state.

Among the ten patients, four showed a modification of their clinical course after

treatment which has been maintained. This was observed in two of the more acute cases of schizophrenia. S. R. had been hospitalized for 3 months prior to his treatment. Two months after treatment he was well enough to spend week-ends at home and one month later he was discharged from the hospital as much improved from his psychosis. S. J. had been hospitalized for more than a year before her first treatment. She improved from an excited, combative, active state to a cooperative and more socially adjusted person within the hospital. A second period of hypothermia was instituted 3 months after the first. This was followed by continued improvement. M. F., a woman of 26, was on a visit at home when it was decided to give her a treatment. On returning home, subsequently, she made a better adjustment, was relatively free from hallucinations and more active in normal, social responses and adjustment.

H. A., a woman of 26, the fourth member of the group which showed continued improvement, experienced a most interesting reaction. She was a medical student at the time she was admitted to a mental hospital in 1937. Insulin and metrazol had been given her with little or no improvement. She was without question the sickest of the group. During the first hypothermia treatment, when her body temperature reached 89° F., she commenced to talk. For all practical purposes this was the first time that she had conversed in more than 2 years, being mute and combative for the most part in the interim. She talked clearly, logically and with insight, and expressed herself normally until her temperature reached 93° F. At this level her conversation became confused and her speech thick. During the four intervening hours she had looked and acted quite normal and could not have been diagnosed as suffering from schizophrenia. When the temperature reached 96° F. she became mute and reverted essentially to her former schizophrenic state. Her conduct during the following 3 months was possibly somewhat better, i.e., she was less combative and while she refused to talk and converse, she was more cooperative in other ways. During the second treatment, 2 months later, she duplicated her previous performance. When her temperature reached 88° F. she became mentally clear and conversed for nearly 4 hours with her father, a physician. As before, when her temperature reached 94° F., she became confused, mentally unresponsive and as the temperature approached 96° F. she was mute. During the following 4 weeks no significant improvement was noted. Her response during the third treatment, one month after the second, was identical with the previous ones. As the temperature reached normal she reverted again, and remained mute, combative and uncooperative for 48 hours. At that time she emerged from her schizophrenic enclosure, requested her personal effects, expressed a desire to dress, wanted her eyeglasses so that she could read, and was again an intelligent social person. She remained in this cooperative, adjusted state for two weeks. Thereafter, she reverted at times but the general level of her mental state was much improved.

Three patients showed a temporary improvement only. S. E., aged 30, had been sick for approximately 6 years and was treated 3 times. Following the first and third treatments she was much better for 3 and 4 days, respectively. No improvement followed the second treatment. H. M., aged 39, was improved for 3 days after treatment. H. I., aged 37, a catatonic schizophrenic, became pleasant and cooperative for 5 days after treatment. All of her catatonic manifestations were temporarily absent. It was concluded emperically that the age of this group, 30 years and older, contributed to their failure to respond for a longer interval.

Finally, three patients appeared to receive no benefit from the treatment. P. M., aged 38, had been sick for 8 years. Her clinical course was unaffected by the treatment. B. R., aged 41, had been sick for more than 20 years, the last 10 years of which she had done little more than vegetate. She was the first person in the series and received the treatment for a relatively short time. W. D., aged 46, had been ill for more than 10 years. He died during the treatment as his temperature was returning to normal. It was a cardiovascular death and if we had had as much information at that time as we now possess, it is hoped that this would not have occurred. A complete autopsy was performed and no striking morphologic changes were observed.

This was the only death in a series of 16

treatments. Furthermore, it was the only untoward reaction observed. The chest was examined at frequent intervals during each treatment and an x-ray of the chest was taken approximately every 12 hours. None of the patients developed an upper respiratory infection or any evidence of pneumonia. This is in keeping with the experience of other investigators. A few of our patients has transient edema of the face, hands or feet but none had any evidence of frost-bite or chilblains.

Any explanation of the pathogenesis of improvement in the first four patients would be premature. The changes in the chemical constituents of the serum were relatively small and probably not significant. A marked lowering of oxygen consumption such as might accompany profound narcosis was not observed. Thus, the improvement observed is not believed to be related to a process which is a counterpart of hibernation. It is not believed to "shock" the patient into his or her senses because the action of hypothermia is not one of shock. Diminished oxygen transport to most parts of the body most certainly is operating. Even though oxygen saturation of arterial blood is maintained within normal limits, the significant depression in speed of circulation of blood must mean that less oxygen is available than normally. Anoxemia *per se,* however, probably is not the determining factor. One of our reasons for making this statement is that anoxemia has been employed without benefit in the treatment of schizophrenia.

The minimum level to which body temperature is reduced does not appear to be the determining factor. It has varied from 93° F. to 78° F. in the improved cases and from 88° F. to 74.6° F. in those who were not helped. It seems reasonable to assume that if the patient is able to respond to hypothermia the response will be evident if the heat regulatory apparatus is over-powered. On the other hand, the duration of treatment is important, just as Fay[9] observed in the relief of pain, and there appears to be some correlation between hours of treatment and degree of clinical improvement. One is justified, also, in stating that the failure to respond during or after one treatment probably means failure during subsequent treatments.

Conclusions

The implications and trends in the malignant psychotic patients herein studied and treated with low temperature have yielded sufficient results to justify its further use in schizophrenia. A more comprehensive statement and a definite answer will have to await further application in a far greater number of patients together with a longer clinical follow-up study. The clinical results would seem to be at least equally as promising as insulin and metrazol in the treatment of schizophrenia. The dangers seem to be less in patients younger than 40 with relatively sound bodies. That hypothermia may be beneficial in the affective mental disorders, i.e., various phases and types of manic depressive psychoses, is a subject which we hope to investigate in a similar study, presently.

Summary

Ten patients suffering from frank schizophrenia have experienced, experimentally, one or more periods of a lowering of the body temperature. In eight of the patients the body temperature was reduced below 85° F. A minimum body temperature of 74.6° was observed in one patient who appeared to suffer no untoward effects. This temperature probably approaches the critical level for humans below which recovery is not possible. A comprehensive study of the physiological changes associated with prolonged depression of the body temperature was possible in this work. The data will be reported elsewhere.

A change in the clinical course was observed in four of the patients. Each of these was younger than 30 and had been mentally sick for a relatively short time. Three patients between the ages of 30 and 45 experienced a transient period of improvement following treatment. Two patients had been sick for more than ten years and exhibited no improvement at any time. One patient died from cardiovascular failure during treatment. It is believed that an error in emergency treatment contributed to his death.

The observation that mute, aggressive, combative and uncooperative patients suffering from schizophrenia may enjoy periods of mental clarity is significant. It suggests

that during the first years of schizophrenia irreparable morphologic damage to the central nervous system does not occur. If the clinical course can be altered during these important years, then there may be a modicum of hope in the treatment of an essentially incurable malady.*

* The following persons aided in the study at various times: Messrs. William V. Consolazio, and Louis J. Pecora, and the Misses Margaret Quirk, Elsa Renstrom, and C. Ruth Veinotte.

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Concerning the General Practitioner's Problems with Relatives of Mental Patients in Michigan*

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Several hundred times daily throughout the United States there occurs an event which might be called an emotional catastrophe: the commitment of a member of some family to a mental hospital. This event assumes such emotional significance because of the extreme attitudes many individuals have regarding mental disease.

By and large, the garden variety of somatic disease is nowadays looked upon objectively by the general public. It is realized that somatic diseases have specific causes and, frequently, specific treatments. In contrast, mental disease is still pretty much of a mysterious business. Its origins are shrouded in obscurity, its occurrence considered as stigmatizing not only to the individual affected, but also to his family in some way, and the chances of recovery believed to be practically nil, so that, in general, the occurrence of mental disease in a family possesses the elements of hereditary stigma, social disgrace and hopelessness. To climax this train of misunderstanding, some member of the family must go to a court of record, file a petition for declaration of insanity, stating therein allegations which become public documents. The individual affected is taken to one of a group of red brick buildings which stud the countryside, and is thereupon usually forgotten by all except his relatives and the personnel of the hospital to which he has been removed.

The subject of this paper concerns itself with the emotional aspects of this situation, a family bewildered, disrupted, and frequently apprehensive. While the treatment of the mental patient has been the subject of innumerable discussions, little thought or con-

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sideration has been given to the problem of dealing with his family.

The general practitioner occupies a strategic position with regard to this problem. He may be considered the liaison officer between the hospital and the world. He is the individual who has observed the continuity of life in the family from which the patient comes. He has their confidence and has observed the progression of the psychosis from its incipience. Should the patient become well again and return, he will once more observe and guide his progress. No social history, regardless of how skillfully written or detailed in account, could possibly substitute for this intimate knowledge and skilled insight. Therefore, psychiatrists are stressing more and more the need of integrating the work that the mental hospital is doing with the general stream of community life, and of coordinating the efforts of the general practitioner in the home with the psychiatrist in the hospital.

Every physician in private practice has at one time or another been faced with the necessity of furnishing advice with regard to the procedure for commitment. Because of the relative infrequency with which this necessity may occur, and also because of several important recent changes in the laws governing this procedure, a brief review may not be out of place. Until 1937 in Michigan, commitment was largely a one-way process, probably reflecting the public attitude of hopelessness with regard to mental disease. That is, once an individual was declared insane, there was no automatic provision by which the question of restoration of sanity would be considered. Accordingly, thousands of individuals were discharged from mental hospitals as improved, returned to family life, carried on their daily activities, worked, signed contracts, married, had children, all the while legally in the status of insane persons. While it is true that these individuals or their relatives could, if they wished, go to the Probate Court and file a petition for restoration of sanity, few knew and even fewer took advantage of this fact. Many of these individuals and their families carried with them the consciousness of this legal stigma, felt keenly the insecurity which it conferred upon them, in some cases sufficiently to cause severe emotional warping.

In 1937 this situation was fortunately changed. In 1937 the legislature amended the existing laws dealing with commitment, and these changes became effective July 1 of that year. The procedure with regard to commitment now is as follows: Any relatives of legal age of the alleged insane person, the guardian, a local peace officer, or any other person the Judge of Probate may designate as qualified, may file a petition with the Probate Court requesting a hearing for the determination of the status of the individual concerned. In this petition, allegations must be stated which constitute the basis for requesting such action. These allegations must be factual, specific and not hearsay. Section 11 of the 1937 Act states: "Such petition to contain a statement giving the facts and not the conclusions upon which the allegation of such mental disease is based and because of which the application for the order is made." Thus it should be stated that the individual concerned "hears voices which threaten him when no one is actually present," states that "attempts are being made to poison him," has "assaulted his wife because he thought she was in league with the Arabs to kill him," and other direct statements. It is not sufficient to say that the individual is peculiar, intolerant, disinterested, loses his temper, or make other statements of deviations which at one time or another might apply to any of us. The legal status of commitments based upon inadequately drawn petitions may be illustrated by the following case brought before the courts for review on a writ of habeas corpus, where the petition for commitment contained the following allegation, namely: "Strange fancies".

The opinion of the Court was as follows: "The allegation of 'strange fancies' states no facts, but merely a conclusion, and without the facts, might be inclusive of no more than freakish, eccentric, humorsome, or whimsical manifestations. The purpose of the statute is manifest. Facts must be stated. Such is the statutory mandate. Facts were not stated. This was jurisdictional. The Court could not assume jurisdiction on the petition filed.

"The action of the probate court was a nullity, is set aside and held for naught, and the petitioner is unlawfully detained, and he is discharged from custody."

With the filing of this petition in the probate court a date for hearing is set, and two licensed physicians appointed to examine the alleged insane person. The findings of these physicians are submitted by certificate and are considered by the Judge of Probate in arriving at his decision. Such certificates, states Section 10 of the 1937 Act, "must show that it is their opinion that the person is actually insane, or feeble-minded or epileptic as the case may be, and shall contain the facts and circumstances upon which the opinion of the physician is based, and show that the condition of the person examined is such as to require care and treatment in an institution for the care, custody and treatment of such mentally diseased persons." Generally speaking, the Judge of Probate is guided by these opinions in his decision. Should the physicians appointed disagree, a third physician is appointed to break the deadlock.

If the individual is declared insane by the Judge of Probate, a commitment order is issued, usually designating commitment to Eloise or Ypsilanti Hospital in this area. This commitment order is legal authority for detention of the insane person in the hospital to which he is taken. If the problem is an acute one, such as with a violently disturbed individual, then a temporary order may be requested at the time when the petition is filed. This temporary order constitutes legal authority for detention of the alleged insane person until the time of hearing and is replaced by a permanent order if affirmative action is taken.

In contrast to other legal procedures and in recognition of the fact that these proceedings are not a punitive measure against the individual concerned, it is unnecessary that the person being committed be present in court for the hearing. Indeed, in the vast majority of these cases, such presence would constitute an extremely traumatic experience. It would produce humiliation, intensify whatever persecutory trends were present and increase the degree of existing antagonisms. Therefore, in discussions with the family, this fact should be specifically brought out.

When the individual is declared insane and committed to a specific hospital by the Judge of Probate, admission to this hospital does not automatically follow. Regardless of the court's action, the law makes it discretionary with the superintendent of the hospital as to what patients he will admit. If, in the opinion of the superintendent, the committed person's condition does not justify hospitalization, he may refuse to admit him.

Once the individual is admitted to the mental hospital, the following dispositions may occur. His commitment remains legally valid so long as he maintains continuous residence therein. If he is paroled and remains continuously outside the hospital for a period of three years, he is then mandatorily discharged. Upon such discharge the probate court must be notified of this fact and must hold a hearing to determine the question of restoration of sanity. The superintendent of the hospital may at any time discharge instead of parole the patient, and similarly, when the fact of this discharge is conveyed to the probate court, a hearing must be held. Or, the patient's relatives or any other interested party may at any time file a petition for restoration of sanity with the probate court whether the patient is within or without the confines of the hospital.

In substance, therefore, the law now provides a two-way process. If an individual leaves the hospital as improved and is able to remain outside, he no longer continues indefinitely in the legal status of an insane person. From a mental hygiene point of view, this fact is of tremendous importance because it provides legal recognition of the fact that mental diseases are not necessarily incurable or lifelong in their duration. Since the average family usually reacts to the first discussion of the necessity for commitment with horror at so radical and irrevocable a step, the reversibility of this proceeding should be stressed far more than it has been and should be used as the focal point for the development of a more optimistic and objective attitude toward the presence of mental disease.

In the City of Detroit proper, the existence of the psychopathic division at Receiving Hospital relieves the general practitioner from much of the necessity for giving detailed instructions to the family. In Detroit, by calling the City Physician's office and having the individual placed in the psychopathic ward of Receiving Hospital for observation, the decision as to the necessity for commitment may be transferred to the psy-

chiatrists there and the Social Service Department of that hospital will instruct the relatives as to procedure.

However, in many of the outlying townships in Wayne County and throughout much of the remainder of the State, the general practitioner is usually the person called upon to assist the family in meeting this emergency. How he gives these instructions, his knowledge regarding the procedure of commitment and his explanation of the way by which it may be reversed, may go a long way in either helping the family to assume a more optimistic and objective attitude, or become pessimistic and over-emotional.

The problem of finances is usually intimately associated with the necessity of commitment. The existence of public mental hospitals is in itself an expression of the fact that the duration of mental disease and the specialized facilities required for its care are ordinarily beyond the financial ability of the average family. However, it is not uncommon to receive patients who have been committed only after long periods of care in private institutions when the severity of their mental disorder was obvious from the beginning, and despite the fact that the maintenance of these individuals in a private institution constituted a severe financial burden upon the family.

In giving advice with regard to this aspect, therefore, it should be recognized that maintenance in the average private institution of merit requires a weekly expenditure of from $30 to $50. Unless there is good reason to feel that the psychosis will be of relatively short duration, the average family is economically unable to assume such a burden. Families who desire to attempt such private hospitalization, even when it constitutes a severe economic burden, are usually motivated by an over-emotional attitude based either upon the feeling of humiliation connected with commitment proceedings or the desire to secure the best that is possible in the way of treatment for their relatives. Much of their opposition may be lessened by a greater understanding of the reversibility of the commitment proceedings, an objective discussion of the psychosis along the same lines as discussions of somatic disease, and a description of the adequate facilities which now exist in the public mental hospital.

The next question the family usually raises, concerns the heredity of mental diseases. The relatives feel that in some way the psychosis is an expression of some weakness which exists in all of them. They wonder whether they may not be similarly destined. If they have children they may brood as to what their fate may be. Genetic studies in the field of mental diseases have revised many older notions and lead us to believe that dogmatic statements regarding the hereditary factor are unjustified. Certainly, neither schizophrenia nor manic depressive psychosis is transmitted as a specific unitary character. Schizophrenia may crop up in a family without hereditary taint, and individuals born of a heavily tainted stock may reveal no evidence of such tainting. Generalizations with regard to this question are unwarranted and the question may be answered only by a careful consideration of each individual family situation.

Where the family background reveals only the occasional incidence of mental disorder, whether schizophrenia, manic depressive psychosis, epilepsy, psychopathic personality or chronic alcoholism, the problem might best be answered by the statement that the range of social adaptation is fairly broad and that occasional occurrences of behavior problems and isolated psychoses are to be found in many family stocks when carefully studied; that life is at best a hazardous situation, that many complications, illnesses and accidents are likely to occur, and that the possibility of psychosis is one among these many. In other words, the development of a philosophical attitude toward the problem should be attempted.

If the family stock presents many cases of schizophrenia, epilepsy, or psychopathic personality on both sides, then, similarly, a philosophical attitude should be cultivated, but the question of limitation of offspring should be seriously considered should such counsel be asked.

In manic depressive psychosis, one sees a more specific transmission than in schizophrenia, psychopathic personality or epilepsy, so that if heavy tainting, as evidenced by a history of obvious manic depressive psychosis, suicidal occurrences, or extreme moodiness is found to occur in the family background, the possibility of further occur-

rence in the family may be anticipated, and the question of limitation of offspring should be even more seriously considered.

However, nature itself helps to limit offspring in these cases, since carefully performed studies have shown that psychotic individuals tend to produce fewer children than those of normal personality make-up. This lower birthrate tends to act, to some extent, as a check upon their increased incidence.

Once the psychotic individual is removed from the home, the general practitioner may be called upon for advice as to how the home situation should be handled.

Consider for a moment such a home. The mother has been removed. Three children, aged 3, 5 and 6, are left with their father. Unless skillfully handled, such children may develop feelings of rejection and insecurity because of her absence. They may overcompensate for such feelings by aggressions and defiance of authority, manifested by truancy, tantrums, enuresis, petty thievery, and a host of other behavior abnormalities. Such a home needs a mother substitute. If economically possible, she may be supplied in the person of a mature, sympathetic and understanding housekeeper. If not, frequently a suitable relative may be called upon to meet the emergency. The understanding of this situation by the physician and his willingness to assist in solving it may serve to prevent the emotional warping of many individuals and constitutes mental hygiene of the greatest importance and value.

In the home deprived of its father, the mother may react with feelings of anxiety, helplessness and insecurity and these may be projected toward the children who will sense her emotional state and reflect it. Here, also, the assistance of the physician in helping her acquire a philosophical and optimistic attitude is of the greatest importance.

The indefinite maintenance of a disrupted home is socially unjustified. Many fathers continue their children in a disrupted home for several years, when the clinical course of the mother's psychosis indicates that little hope exists of her return to the home with successful readaptation. In such cases, the father should be urged to re-establish the home with a suitable housekeeper or female relative as a mother substitute. If that is impossible, foster or boarding home placement through an agency should be considered. Not infrequently, in such cases, the father, because of his desire to reestablish the home, impresses his physician with the excellent adjustment his wife has made to the hospital routine and urges his assistance in obtaining her release. It should be remembered that the subsiding of acute psychotic behavior is not in itself a sign of improvement. Many schizophrenics, particularly those of catatonic and hebephrenic type, develop a chronic static phase where their social defects consist of acts of omission rather than acts of commission. Because of their physical underactivity, emotional apathy and lack of interest, they are unable to offer their children love, affection and adequate care and these deficiencies from a social point of view may be fully as harmful as the more obvious dangers which may occur with an acutely disturbed person.

The over-solicitous, extremely anxious relative constitutes a considerable problem. He reacts to the commitment of his loved one with much emotion and anxiety. He shows his devotion by frequent visits to a degree where they exclude leisure activities and social obligations. He is tense, often apprehensive about himself and frequently projects this emotional state so that it involves other members of the family as well. We see such reactions in individuals who have a bad conscience with regard to their psychotic relative. The son whose mother has become senile may feel that his lack of affection and grudging financial assistance in past years may have contributed to her illness. The husband may feel that his excessive devotion to extra-marital interests such as women and drinking, or his scolding and reproaches may have been a contributory factor. The father may feel that his wife's exertions with regard to the rearing of children, necessity for careful budgeting on a meagre allowance, or his insistence upon sexual relations when she was tired or unwilling may have been a factor of importance. Such over-solicitude and anxiety may constitute a real problem because it frequently interferes with efficient social performance and may have undesirable effects upon other members of the family. Its recognition and correction is therefore essential.

In the majority of such cases a careful discussion of some of the causative factors and an objective presentation of the nature of mental disease, pointing out the essential factors concerned, such as some degree of constitutional predisposition and impersonal precipitating environmental factors, may help to correct the guilt responsible for over-anxiety.

Similarly, the family which reacts by over-humiliation and shame as a result of the occurrence of psychosis may be greatly aided by a discussion, pointing out the causative factors involved in mental disease, discussed in the same way as one would discuss tuberculosis, heart disease, or other somatic ailments.

The over-optimistic relative needs tactful readjustment to protect him against too severe disappointment if remission should not occur and to prepare him gradually for the chronicity of mental disease, where improvement is measured by weeks and months and not in days as in the acute diseases. Relatives also need preparation in the way of information as to some of the procedures which are carried out in mental hospitals. The private practitioner can be of great assistance in discussing some of the newer techniques, such as insulin and metrazol treatments. Discussion of such treatments which are directed against the psychosis at the somatic level are much appreciated. They help the family to look upon mental diseases in an objective way because treatment at the somatic level is readily comprehensible to them and relates mental disease to somatic diseases.

The prognosis in mental disease varies inversely with its duration. This is particularly so in schizophrenia and general paresis. Insulin and metrazol treatments will produce remissions in 80 per cent of schizophrenics in their first six months of psychosis. By the fifth year, the remission rate has dropped to 20 per cent. Four out of ten paretics treated early with malaria or tryparsamide will exhibit social recovery. By the fifth year their chances are almost nil.

The early admission of these cases to the mental hospital depends upon the general practitioner. He sees them first and can impress the family with the importance of prompt commitment and early treatment.

We feel that continued progress in the treatment of mental disease can only be made by a broad concerted approach utilizing all of the medical and social forces of the community. In such an approach the general practitioner occupies a vital spot. He must act as liaison officer between the hospital and the family and not permit this function to be usurped by the social worker or some other individual.

We, on our part, contact the private physician regarding each of our patients when admitted and in turn inform him when the patient is paroled. In the patient's visits to the Eloise Parole Clinic in Detroit, we maintain psychiatric supervision only and refer the patient to his family physician for problems of a medical nature. We feel that continued and even greater activities along this line are indicated and would welcome inquiries with regard to the management of specific problems involving the patient and his family, both before and after parole.

Finally, as Confucius may have said, "He who has patience with relatives has lots of patients."

Eloise Hospital.

See our Back Inside Cover and Find Out

"WHAT THEY SAY"

About Diseases of the Nervous System

Improved and Apparently Safe Technic of Insulin Treatment of the Psychoses

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Dr. Von Hagen graduated from Northwestern University Medical School in 1932. He is an Instructor in Neurology at the University of Southern California and Junior Attending Physician in Neurology at Los Angeles General Hospital. He has published a series of papers on Neurology.

In 1938 we reported complications in insulin treatment of the psychoses, particularly pulmonary edema and embolism. At the time, only 20 cases had been treated according to the method outlined in the monographs of Sakel and of Braunmühl. We had not had the privilege of personal observation of the methods, but were forced to rely on the literature. As the reports in the literature were followed and as experiences of others in this country were gathered by personal contact with physicians using the method, it became evident that the success of our efforts was like that of others. As we had no morbidity or mortality in the first twenty, our results were better than average.

Briefly stated the technic was as follows: The patients were given their insulin at seven o'clock in the morning; they were allowed to go into coma and remain so until the clinical condition indicated advisability of termination. They were then restored to consciousness by means of intrastomachic instillation of dextrose solution. The usual time for termination was between 10:30 and 11:30 a. m., after which lunch was served and the treatment was considered at an end.

The chief difficulties which we encountered were as follows:

(1) While the time interval between instillation and return to consciousness was usually 3 to 7 minutes, in some instances it was 30 to 45 minutes.

(2) Delay of return to consciousness was found to be due, in some instances, to slowness of absorption from the bowel (not dangerous), but in other instances it was found due to pylorospasm resulting in vomiting of the instilled solution one-half to one hour afterward. By the time vomiting occurred the patient was often in dangerously deep coma because one depended on his having absorbed glucose and intravenous infusion was not given until the lack of absorption was discovered.

(3) Methods of preventing pylorospasm were unsatisfactory because they were unreliable.

(4) Instillation of glucose into the stomach was found to be distinctly dangerous in cases in which there was tendency to accumulation of fluid in the trachea; pulmonary edema was precipitated by the instillation on several occasions.

(5) In the very cases in which it was most urgent to resuscitate the patient because of threatened pulmonary edema, the usual method (instillation) could not be used, because of the danger mentioned and because of the time required for the tube feeding process.

(6) Because of the uncertainty of the tube method the dosage of insulin was, of necessity, conservative.

(7) Secondary reactions to the insulin were frequent in the afternoon and night. Constant nursing attention was required 24 hours a day and we were frequently forced to return to the sanitarium to take care of these. They were dangerous because of their precipitate occurrence and their severity.

After three nearly fatal instances of pul-

monary edema in the first 20 cases, we directed our attention particularly to the prevention of this difficulty. In the treatment of the patients who had already developed the complication we found that intravenous administration of dextrose (50 per cent) was of distinct aid; hence we argued that it might be used prophylactically. We began to revive all patients with an intravenous injection of dextrose, even though Sakel's second monograph had appeared in which he stated that he had practically abandoned the intravenous method. We found almost at once that we had much more accurate control of the termination than we had had by the old method.

In the first place, we could always arouse the patient in a few seconds with an intravenous injection of 20 cc. of dextrose (50 per cent), unless we had misjudged the degree of coma. In the cases in which the first injection failed, within five minutes another injection was given and to it was added 10 to 50 mg. of thiamin chloride. Failure to arouse immediately with that method was extremely rare and when failure did occur it was entirely safe to leave the patient with an order to the nurses to instill tube feedings of egg nog and orange juice periodically. In a few hours the patient would always regain consciousness and there was no danger of pulmonary edema.

It was subsequently found that there was a definite relation between the size of the first intravenous dose of dextrose and the occurrence of secondary reactions in the afternoon and during the following night. Further investigation showed that this relationship was referable to the dosage of insulin in the case in question. The larger the dosage of insulin the larger was the required dose of 50 per cent dextrose, if we were to avoid secondary reactions. Speaking in generalities we can now say that an initial dose of 20 cc. of 50 per cent dextrose will prevent a secondary reaction if the dose of insulin on that day has been less than 100 units. At least 30 cc. are necessary if the dose has been 300 units and at least 50 cc. are necessary if the dose has been 500 units of insulin on that day.

The prevention of secondary reactions was a matter of great importance because, unless we could depend on the nurses to give intravenous injections (a bad situation), it became necessary for us to keep a doctor at the hospital at all times. By giving larger initial doses of the intravenous solution all this was prevented.

We settled down, then, to the technic of reviving the patient routinely with intravenous dextrose. When the patient has had his initial intravenous injection of dextrose he arouses immediately and drinks a quart of sweetened orange juice. (About a teaspoonful of table sugar is put into each glass of juice). The patient is then safe until his tray is served at noon and, if the initial intravenous dose has been sufficient, he is safe after ordinary feedings for the whole night.

As soon as this technic had been elaborated, we found that we lost all fear concerning overdosage with insulin. We found that we could begin every case with a first dose of 40 units of insulin and increase at the rate of 40 units per day until sensitization was accomplished. In case of overdosage, the worst that could happen was that the patient would go into coma an hour earlier than intended, but he could be restored at any time. With this feeling of confidence, we could attain the required dose for each case in much shorter time than we dared by the old method, and thus we could save days in the course of a treatment. Besides, we could safely permit deeper coma, and a doctor could safely handle more patients simultaneously because he had the power to restore the patient in a few seconds instead of having to spend 10 to 15 minutes in giving warm and filtered juice by instillation into the stomach. A single doctor has handled 11 cases by this technic. In the rare instances in which four patients have simultaneously required restoration the four intravenous injections have been given in five minutes or less; any patient can wait five minutes from the time his condition demands it, so long as it is possible to restore him in less than one minute.

We have now treated 69 patients (50 coma days each) with this technic without morbidity. In the entire 89 (i.e., inclusive of the first 20 in which we encountered complications) we have not had a mortality. We do not know of any case in which the patient has been left with any sort of disability through the treatments. We have gained a great deal of confidence in the safety of the treatment and above all the *results with the*

newer technic are as good as, if not better than, they were with the old.

It may be worthy of mention that we have used ethyl alcohol (90 per cent) exclusively for sterilization of the skin preparatory to giving the intravenous injections. Although we have now given between 3500 and 4000 injections we have not had an infection. We *have* had an occasional transient traumatic neuritis of a small cutaneous twig. Recovery from the neuritis has occurred spontaneously in all cases. We have never failed to find a vein for the intravenous injection although we admit that when a patient is writhing, injection is difficult and when he has had over thirty consecutive daily injections some veins become temporarily occluded. Nearly all of the difficulty which is encountered in intravenous work is due to defective needles. If pains are taken to keep all needles in good condition, veins are infinitely easier to enter.

Of economic rather than scientific interest is the fact that one can carry out the intravenous technic with one-half the number of nurses required for the intrastomachic method. While three or four nurses may be required for a moment while the injection is given, they are all released immediately. But when tube feeding is used, a nurse must be left at each patient for perhaps half an hour to look after details and to nurse the patient.

The technic just described is sort of a standard for schizophrenia. But it is dangerous to assume that this technic must of necessity be applied to every case. There are unclassifiable cases in every man's practice and the ingenuity of the therapeutist is often called upon to meet unusual situations. We have had several cases of psychosis in which hypomanic activity was the most prominent symptom and in which anomalous reactions were encountered necessitating radical modifications in treatment. These reactions may be grouped as follows:

A. *Loss of weight*—If the patient loses weight under the standard insulin treatment he is not going to recover by that method. In the cases so far treated there were three (ages 19, 42, and 48 respectively) in which the patients lost as much as 10 to 15 pounds of weight in the first two weeks. They were quieter under the insulin management, but it was obvious that a patient already thin could not survive the loss of a pound of body weight a day. Moreover, they did not improve mentally; they merely became quieter. In each instance we stopped the routine method and instituted a dosage of 5 to 10 units of insulin with each meal. As the patients were too disturbed to eat, tube feedings were necessary. On this regime the patients soon regained their lost weight, but resumption of the standard treatment resulted in another period of loss. We thus tried one method after another constantly guided by clinical judgment and in all three cases recovery was obtained. No one recovers unless he gains in weight under the treatment.

B. *Rise of temperature*—In our experience, patients with hypomanic activity who develop fever without discoverable cause (102° to 105° F.) usually associated with leukocytosis (up to 23,000 per cmm.) but without infection do not respond to the standard insulin treatment. They must be handled according to the treatment outlined under "A". This management has been successful.

C. *Progressive sensitivity to insulin*—Some patients become progressively sensitive to insulin to an amazing degree. While one expects to reduce the daily dosage about 20 to 30 per cent as soon as the first profound coma is reached, there are cases in which the sensitivity increases so rapidly that repeated large daily reductions are necessary. One young man required 550 units before he finally went into coma. The dosage was immediately reduced to 450 but his coma was still profound to the point of being dangerous. It was reduced to 400, 350, 300, 250 and then to 200 units but on the day that he had received the 200 units we found it impossible to arouse him for some hours. We reduced his dose to 100 units. As he then did not lose consciousness we increased it to 150 and that became his regular dosage with appropriate reactions.

D. *Catatonic unconscious excitement*—While one ordinarily expects a period of excitement in the course of each day's treatment, subsequent quiet and coma are to be expected and one does not revive the patient until he is quiet. However, we have had one case in a powerful and large young man in whom a quiet state never supervened. The excitement in each treatment went on to decerebrate rigidity and it was necessary to give the intravenous injection while the pa-

tient was tossing about on the bed with four assistants attempting to restrain him. After many trials we finally recognized that quiet coma could not be waited for unless we wished to court death daily. The daily dosage before sensitivity was reached was 450 units. As this was progressively reduced to 250 the reactions never changed in type. The patient was never aware of his excitement and had no memory of it. Occasionally, he became more violent *after* his intravenous injection. When this occurred he was aware of his excitement and was profusely apologetic for it but was never able to control it.

Summary of our New Method

(1) Patients in insulin coma are invariably revived by intravenous injection of dextrose solution (50 per cent in distilled water).

(2) The quantity injected depends on the total dose of insulin given on that day. It varies from 20 cc. to 70 cc.

(3) Immediately after revival the patients are given 1000 cc. of sweetened orange juice to drink. They are then fed their noon meal early in the noon hour (11:30).

(4) The advantages of the method over the old method of intrastomachic instillation of syrup are:

a. Much better control of revival.
(b) Avoidance of secondary insulin reactions.
c. Avoidance of pulmonary edema.
d. Larger doses of insulin can be given with safety and more prolonged coma is possible.

(5) The results with this method are as good as, and probably a little better than, with the old method.

(6) There has been no morbidity or mortality in the 89 cases treated (20 by the old, 69 by the new method).

(7) One must absolutely avoid considering the method here outlined or any other method as dogma. The therapeutist must have the initiative and courage to modify the treatment any day in any case to suit the clinical requirements.

Unwanted — Unloved Children

A Study of Nervous Parent—Child Relationship

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Members of an ideal family may be noted for their calmly cheerful disposition, capable work and contented family life. Successive generations may exhibit similar qualities. Parents and children love and respect each other. The cultured daughter seldom exchanges her home town life for a "parlor pink," radical existence in a distant city. Nor does the son marry a girl of different economic, or social position. Newly wedded additions to the family conform to the admired familial standards. Children are desired, and are said to be a "chip off the old block," or a "good child" because their psychological reactions are similar to those of their parents. This family constitutes the dependable, conservative element of the community. It may not produce great discoverers, reformers or world famous leaders. Likewise, it seldom contains the unusual people who are neurotic or psychotic. The security of parental love in childhood is associated with a calm manner of accepting life and a comfortable feeling of self reliance even if real troubles occur. Adult misfortunes seldom cause serious nervous conditions, for they cannot reactivate a non-existent, early frustation of being unwanted and unloved by the parents.

Many psychiatrists now teach that functional nervous conditions arise from unfortunate childhood experiences with emotionally maladjusted parents. That this teaching is not generally understood is suggested by

an apparently sensible physician's recent advice concerning his son's hysterical wife: "Slap her on the face with a wet towel. That's what they did for grandma's spells and it sure brought her out of them." This "treatment" may temporarily distract the patient's attention from the symptom. It does not alter the neurotic disposition. It does not prevent recurrence of the symptom. It is no more kindly than the flagellation therapy of Medieval days when disturbed mental functions were attributed to the devil entering the human body, and treatment consisted of driving away the demon by beating with chains the mentally sick person.

While it was believed that functional nervous disturbances were inheritable, families with this type of illness considered it a disgrace. People often avoided marriage or even social contact with these families. Hence, the mentally sick relatives were hidden from the world. Those with noisy, overactive disorders were chained secretly in the attic; while the less obviously nervous ones remained for years in the upstairs bed room of their home, "retiring from the world," as it is called in communities where even today the custom persists.

For many years the neuroses were thought to arise from physical disease. As late as the mid-ninteenth century, the reputable medical texts described numerous drugs that were said to cure hysteria. Now we think it is not the medication, but other factors, including a pleasing personality of the medicine giver, that help these patients, for a drug prescribed with good results by one doctor may not help if administered by another. The neurotic person who likes a doctor can follow his suggestion to feel better after taking the medicine.

With the discovery of general anesthetics, there were surgical attacks on hysterically disordered parts of the body, often the uterus. Many ninteenth century physicians, following a concept of the ancient Greeks, described painful, wandering, abdominal masses that they believed to be the uterus. Only recently a patient was reported by her husband to have been relieved of a hysterical convulsion by the doctor adjusting her "tipped a little too far back" womb. Prolonged study of these patients shows that physical manipulations, especially surgery, is followed too often by increase of nervousness, or even a psychosis.

However, the modern psychiatrist may prescribe *psychological surgery*. This consists of helping the patient to sever bonds that tied him emotionally in childhood to nervous personality traits of his family, bonds that compel him as an adult to react according to the neurotic qualities of his family. While bound, he must either follow the teaching and example of his parents, or he must do just the opposite. He cannot freely use his own intellect in judging the propriety of a specific act.

Since nervous parents have socially useful as well as harmful personality reactions, one may wonder why their nervous child so often chooses unfortunate parental traits as a model for future conduct. This may be determined by the child's resentment to the parents and by his desire for revenge on them because these same parental traits caused him so much discomfort. A neurotic son of nagging parents expressed this thought, "To them I said, 'Alright, I do as you show me to do'; but to myself I said, 'By following your example I allow the world to see that I am a living, sick testimonial of the mean treatment you gave to me.' "

Among nervous patients, the most common, fundamental resentments of parental treatment are: being *unwanted,* and being *not loved* by the parents. When a child has no cause to be resentful about these two factors, its psychological development probably goes along smoothly, regardless of how one handles important questions of rearing, such as breast feeding versus artificial feeding; physical punishment versus parental lectures; or a full explanation of the facts of life versus the parental attitude of, "Don't ask such nasty questions." The existence of natural parental love may explain why there were many healthy children before the publication of child guidance literature.

A boy's reaction to his parents' unloving attitude is seen in his mother's complaint that her 3 year old boy sucked his lower lip, ate poorly, and refused to obey her commands or those of her husband. The mother spent much of her maternal life in games of bridge and golf. The father's business kept him away from home during most of the boy's waking hours. When at home, the parents allowed him to see their quarrels. Since his birth a nurse presented him with his bottle feeding

or solid food. Thumb sucking was prevented by mechanical devices. His mother grew irritable and he had crying spells when she was with him more than an hour. She was puzzled that he refused food when she occasionally offered it to him. Yet she knew that even domesticated animals obey, and appear emotionally attached to those who feed them regularly. She claimed that she had planned for her son and that she loved him dearly. That he doubted her love was suggested by his turning his interest, not to the parents, but to himself (thumb and lip sucking). That he resented parental inattention to him was apparent in his unhappy, negativistic reactions to his parents.

Nervous adults seldom admit easily that they were unwanted or unloved children. These unpleasant facts may be forgotten, but the painful emotional reactions to them may persist. This was a factor in the neurosis of a 30 year old, unmarried woman who complained of fears and sad spirits of undetermined origin. In talking voluntarily about her symptoms she proudly described her parents' love for her as shown by their sending her away from them on long costly trips, and their paying the expenses of a governess to stay with her during their frequent absences. At first, she admitted no resentment of having been deprived of their personal loving attention to her, but later she recalled that before her fifth year she had often wept sadly because she imagined that she was an adopted child.

When asked if they love their children, parents usually reply affirmatively. Our culture seldom tolerates the thought of a parent despising its child. A few, particularly honest, nervous parents admit that their child was not planned for, but they usually hasten to add they have loved the child since its birth. Some causes of a child not being wanted are: The parents were unmarried at the time of the child's conception; they were estranged temporarily; they never did love each other; they feared lest familial nervous troubles be inherited by the child; and they realized their own nervousness, they recalled their own miserable upbringing by nervous parents, and they wished to prevent someone else repeating their own suffering.

Parents usually do not tell the child that it wasn't wanted, or that it isn't loved. The child may realize these unfortunate parental feelings through overhearing secret parental talk, or through an indirect route of another child whose parents have told it the awful secret confided in them by the unloving mother. More commonly the child gains the impression that it is not loved because the parents quarrel and fight; they stay away from home; they do not appear happy while they personally care for him; they do not provide sufficient funds for his needs while they are very generous with someone else; they do not praise him for his good deeds, nor punish him for his errors; they often nag at him; they restrict his activity because of their fear lest he be injured; or they punish him unnecessarily often and severly.

The neurotic child, through association with an emotionally unstable family, may feel toward important members of the family varying combinations of love, anger, sadness and fear. The unstable emotions may persist in adult life and may be transferred unjustly to people outside the family. This may occur when the appearance, or the personality of the new person, resembles that of someone in the neurotic's family. A boy who was irritated by his parents' mean, unfair conduct never liked his school teacher. A grown man called his wife "mother," and complained about her cooking, which factually was very good, just as he formerly complained about the poor food served by his mother. A neurotic salesman spoke of his business chief as "the old man," an expression that he used in reference to his father. He was fearful while asking his chief for a raise in salary, just as he formerly was afraid to ask his father for a dime. The neurotic person may be unable to enjoy or to reject new acquaintances according to their own personalities. He may have to continue his search for a good or bad father, mother, brother, or sister in each new acquaintance; and he often has to turn quickly against them on discovering their weak points. He is similar to an inferior servant whose manner of talking resembles that of the last admired guest in the home.

Parents may "spoil" an undesired child by giving it special favors to appease their own conscience for not wanting the child. A mother of five children spoiled one of them—a son who was undesired. The other children were planned for; but he was conceived at a

time when the family temporarily had suffered financial reverses and when his mother wished to carry on an active social life that would have helped her husband's business. She reproached herself for not having wanted the child. Hence, as she said, "I didn't have the heart to say, 'no' to him and to punish him as I do with the others." He overheard her when she self-rebukingly told a friend that she hadn't wanted him. He observed that she denied his requests less often than those of his brother and sisters. They were free of nervous traits; but he demanded that he hold his mother's hand while he went to sleep, he was fussy about his food, he wet the bed longer than normal, and he had temper tantrums.

The unwanted, unloved child's rebellion against its parents may not be expressed directly as a resentment of not being loved, but the child may complain of feeling inferior about parental foreign birth, shabby clothes, cheap dirty homes, or the poor neighborhood in which the family resides. That these complaints may not be the real source of the inadequate feeling, is suggested by the many children who are loved by their parents and who do not feel inferior about less important parental states.

A six year old boy whose parents beat him unmercifully for his slightest misdeed rebelled indirectly by denying his paternity. He said he had been kidnapped from his real parents who were the King and Queen of England. A pre-adolescent boy had fearful, sad, compulsive imaginations about his parents dying of pneumonia. He admitted no unpleasant feeling for them. They constantly nagged him to wear his heavy coat, his rain shoes and his hat lest, "you catch your death of cold."

A 17 year old girl whose parents quarreled with each other and with her when they were together, rebelled openly by threatening to leave home. Her mother complained about her, "She always says, 'No,' before I have finished telling her what to do." Her parents retired early at night and left home for work soon after breakfast. They could not understand why she was irritable when they tried to make her stop her habit of going to bed late at night and of sleeping until noon. She was proud that her sleeping schedule was not like that of her parents. Yet she really was not free. With her negativism to her parents she could not elect to sleep early or late.

A tense, irritable mother complained about her five year old son's angry statement, "Mother, I wish I could cut you to pieces with the butcher knife." Such a socially unacceptable wish is recalled with difficulty by the usual nervous adult. Even in childhood a thought of injuring the parents often is disguised. The nine year old daughter of a nagging, emotionally unstable mother, while walking home from school, played a game. It consisted of stepping on each crack of the side walk as she repeated the rhyme, "Step on the crack and don't break your mother's back." Her favorite fairy story was "Snow White and the Seven Dwarfs." She often persuaded her school teacher to read it aloud. As the ill fate of the step-mother was described, the child giggled tensely. In play acting the story with other children, she took the part of Snow White. The popularity of this fairy story has continued, perhaps because it may fulfill a socially useful purpose. Children by hearing the story may obtain a vicarious revenge on unloving parents. This type of revenge may not cause excess guilt in the child, for the mother figure is not a real mother but a step-mother who changes herself into a witch; also, the child does not create the story, but merely listens to it.

Unfortunate early rearing may appear to produce little nervous conflict until marriage is attempted. The thirty year old daughter of a neurotic family wished to admire her father and to realize his pride in her. She could not fulfill her wish, for her mother was jealous of her father's interest in his daughter; and her father appeared to care more for his work than for his family. The daughter in early childhood realized that her father paid little attention to her unless she had stomach complaints. Her vomiting spells were attributed to the "weak stomach" that occurred often in the paternal family. Other than noticing that she was like her father's people, the family did not consider her unusual until she made repeated failures in attempts to marry. With each failure she developed vomiting spells and she grew more depressed. She even attempted suicide after the death of two sweethearts. One of these was fatally ill and the other was an airplane pilot when she fell in

love with them.

When parents quarrel and fight, they deprive their children of kindly parental attention; and there may be an unjust transfer of quarrels from the parents to the children. As a child of fussing parents remarked, "If the chimney smokes, or if the cat has kittens in the parlor they think I am responsible." A thirteen year old son of unpeaceful parents fought and quarrelled with them each day. They thought him disrespectful of his elders and they spanked him. This was one of the few parental interests that they voluntarily gave him. A twelve year old boy's mother spent more time at dancing parties than in child rearing. He suffered from many physical complaints of nervous origin. In describing his relationship to his mother he said, "She is kind to me only when I am sick." His mother said he had not been planned for. She asked why she could really enjoy him only when he was very sick and she was spending long hours rocking him to sleep.

Unfortunate parent-child reactions may occur when a child of a specific sex is greatly desired and the child happens to be of the opposite sex. A nineteen year old schizophrenic boy's parents hoped for a girl when he was born. He wore long curls and lace on his collars until the other boys teased him. His parents' nick name for him was one that usually is applied to girls. At times, in his psychosis while making effeminate gestures with his hands, and talking in a high pitched voice, he politely tolerated his parents' kisses. In another stage of illness he made ugly facial grimaces, cursed gruffly, kicked the furniture, and struck his father.

Summary

Some older beliefs about the nature of nervous conditions were compared with more modern teachings. It was shown by case histories that nervous parents cause various, resentful, nervous reactions in their children by not wanting them and by not loving them.

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Virchow as Neurologist and Psychiatrist*

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On October 13, 1901, physicians the world over paid homage to a wisened, bespectacled old man, whose only affliction, as Samuel Johnson might say, was an incurable eighty years. This man had made use of his hours with such consummate skill and had wrought with such diligence that his achievements had few parallels in medicine. We do not think of him at first as a neurologist or a psychiatrist, but time and again you and I have read the words, "Virchow war der Erste." Finally, my curiosity led me to inquire to what extent Virchow had been the first in our chosen field of work, since its aspect is particularly broad and we are, after all, physicians at large. A brief sketch of his life will help us measure the full impact of his influence on medicine and on society in general.

Born October 13, 1821, in Pomerania, Virchow seems to have wasted little time in getting started, for at the age of twenty-two he was already an interne at the Charité, at twenty-three a pathologic assistant to Robert Froriep, and at less than twenty-five Professor of Pathology; at twenty-eight he was banished from Prussia, but at the age of thirty-five he was recalled to the Professorship at Berlin, on his own terms. The years before the age of fifty-two he devoted largely to pathology, the subsequent years to anthropathology, and almost the whole of his eighty years to public hygiene.

He followed the principle, "first weigh, then venture." Fearlessly and without compromise he threw old ballast overboard and always had at hand a new and better struc-

* Read before the Central Neuropsychiatric Association.

ture to take its place. His articles on medical topics ran into the hundreds; he wrote on Troy, beans, gunpowder and old boots, was editor of numerous publications, and founded and guided the famous Archives to its One hundred sixty-ninth volume. His social point of view might be characterized by Henry Fielding's subtle remark: "Now the highest order of mortals are sitting down to their dinners, and the lowest order to their suppers." He was the professor when he spoke to aristocracy, and he was the professor when he spoke to the wives of workmen on the baking of bread; the former hated this, the latter enjoyed it. He used snuff and he was never on time. Petersen related that while Virchow, already an old man, was working in his laboratory, a red faced and highly indignant man rushed upon him. This man explained that his wife had died and her body had been examined, but that when they had come to bury her, on going into the morgue he had found the coffin, and beside it on the floor the body of his deceased spouse, and in the coffin a burly man snoring on the satin pillows. Virchow rushed downstairs, threw the drunken Diener out of the casket, kicked him into consciousness, replaced the body of the woman, sat at the side of the husband through a long funeral service, drove with him to the cemetery, and spent five hours in atonement for the injury that had been done the man. He knew what other physicians were doing and was generous in his characterizations of foreign physicians, particularly the English. He was the terror of medical students, but he was one of the greatest teachers that ever lived. Twenty thousand specimens of his own handiwork filled the shelves of his museum. He designed hospitals, a system of water supply and sewage disposal, markets, parks, and gardens, and fostered the electrification of Berlin. Though he wrote prodigiously, he was concise, clear, accurate, and interesting. Morgagni once said sarcastically, "The intellectuals call it hydrocephalus, the ignorant, water on the brain." Virchow called it water on the brain, and it could not be said of him, as Wellington said to one of his officers, "Sir, your information exceeds your understanding."

A moment ago I let fall some remarks concerning Virchow's social and political activity. Today the world is beset by psychopaths and charlatans who are plunging nations headlong into madness. Let us see Virchow, the psychiatrist, in action. Politics, he said, is medicine in a large sense. Evidently he had not come across the sentence, "a soft tongue breaketh the bone." As an army surgeon he was detailed to go into Silesia to investigate an epidemic of typhus. His 179 page report is one of the masterpieces of medical literature. He was aghast at the privation, filth, and ignorance of the people, who were dying by thousands of starvation and disease. He said that for seven hundred years the law had been there; the authorities had been there. The law did not help for it was only on paper; the authorities did not help for their activity was only on paper; the whole state was a house of cards. The injury was deeper than could be cured by drugs. Then, as now, it appeared that the powers of government were more evident than the wisdom with which they had been put to use. Virchow suggested that Silesia be turned over to the great Slavic neighbor with which it was psychologically affiliated. He demanded a reduction in working hours in the interest of general cultural development and home life. He insisted that all military expenses be curtailed and he fought for the disarmament of Europe. With his great influence, he controlled the budgets and came into conflict with Bismarck. The resulting dispute was so acrimonious that Bismarck challenged him to a duel, which Virchow had the good sense to refuse. He criticized the muzzling of the press and the regimentation of physicians, for the physician, he said, is the natural guardian of the poor. "I know a family," he said with biting sarcasm, "a very excellent one, in which the grandfather had softening of the brain, the son hardening of the brain and the grandson no brains at all." He referred to the three kings of Prussia.

On Virchow's appointment as Froriep's assistant he was assigned the study of phlebitis. This turned out to be one of his most important contributions. "I had the good fortune," he said, "to observe instances in which the torn-off portion of a thrombus fit like a cap on the end of the thrombus from which it had come." Thus the clinical pictures of pulmonary, mesenteric and cerebral embolism were completed. A study of pyemia

led to the discovery of a separate entity which he named "leukemia." In 1858 he promulgated his famous thesis on cellular pathology, according to which all cells spring, not from a homogeneous fluid, but always from a parent cell. In 1865 appeared his monumental contribution on tumors and his proof that sarcomas spring from connective tissue. We are inclined to accept the present necropsy technic thoughtlessly, but we owe largely to Virchow the development of the modern technic which exposed all parts of the cadaver to meticulous macroscopic investigation. His technic became the accepted medicolegal one.

At this point we may turn our attention to his more important contribution to neurology. Froriep slit the spinal cord lengthwise, anteroposteriorly; it is obvious that many important lesions were missed. Virchow cut the cord transversely. In examining the brain he insisted that the ventricles be opened first, lest the ventricular fluid be lost for study. From the remainder of his ingenious technic for examining the brain most modern neuropathologists stand aloof, since it interferes too much with subsequent orientation.

While studying the ependyma of the brain, Virchow's interest became diverted to the underlying network of tissue which he pursued through the brain, cord and peripheral nerves. He concluded that this tissue was not neuronic, but that its function was sustentacular and he designated it by a term so familiar to us, namely, "neuroglia". Neuromas he classified into the true and the false, depending on the relative amount of parenchymatous nervous tissue present in them. For myelosarcoma, encephaloid, fungus haematodes, pseudo-encephaloid, he coined another word we use daily, "glioma". To describe the cellular, fibrous, soft, tough, vascular, and slimy tumors he coined such terms as "myxoglioma," "gliosarcoma," "fibroglioma," and "psammoma". Some semblance of order was thus introduced into the bewildering field of cerebral neoplastic nomenclature. How much this was further clarified by one we have the honor of numbering among our members I need not tell you. As a result of this knowledge, in many cases a patient may now be parted from his tumor without necessarily being parted from his life.

With Koeliker, Virchow demonstrated that perivascular accumulations of blood, water, and lymphocytes could lift the surrounding tissue like a mantle from the blood vessel. Thus we have come to speak of "Virchow-Robin spaces." A notable contribution was his exposition dealing with septic emboli that had passed from the lung to the brain.

Meningeal apoplexies had been conceived of as being extra-, intra-, or subdural, with subsequent organization of the clot. Virchow sensed the clinical incompatibility of this view and concluded that the process must be reversed: first, the intradural organization of an inflammatory process and the formation of a pseudomembrane, a condition he called "pachymeningitis" and which called for the development of many blood vessels, and then the rupture of these vessels with subsequent formation of the hematoma. The physiochemical foundation which permitted a still further elucidation of this troublesome subject had not yet been laid, and by this time you are thinking of a valuable contribution made by another one of our members.

Purkinjé had coined the term "corpora amylacea," but there had been no method by which these could with certainty be distinguished from psammoma bodies. This Virchow did by introducing a microchemical method in which iodine and sulfuric acid were employed. Virchow showed that corpora amylacea almost never occur in children, that they increase with increasing age, that they are found most often near the ependyma and in diseases associated with gliosis.

The skull he studied with especial care, particularly the skulls of cretins. The endemic distribution of cretinism, he contended, pointed to local causes that pertained also to the formation of goiter. Less important contributions dealt with the subject of neural atrophy, spina bifida, prolapsed intervertebral disk, calcification of the brain cells, tabetic arthropathies, the dilatation of vessels in the fourth ventricle in cases of epilepsy, and psychoses associated with lithopedion, or calcification of the fetus, with tubal pregnancy, and with the puerperium.

Virchow's views on the possible relationship of tabes to syphilis are interesting in that he said, at first, "some cases of tabes dorsalis are syphilitic in origin." Later, however, he said, "Of the many etiologic possibilities that might be searched for in the history, one finds

that syphilis fits exceedingly well, but guided by purely pathologic evidence, such as the formation of gummas, I find that it does not fit at all." To attempt to prove such a relationship from the anamnesis is a method no more scientific than the throwing of dice, he said.

Not without interest to neurologists and psychiatrists is a clinic Virchow gave at a meeting of the Berlin Medical Society, in 1870, with Chang and Eng as subjects. These patients were born in 1811, of Chinese parents who had emigrated to the vicinity of Bangkok. They were identical twins, united at the thorax, and at the time of this meeting were fifty-nine years of age. This xiphopagus in which the attachment was, as usual, between the xiphoid and navel regions, is better known to us as the Siamese twins. At the age of six or seven years Chang and Eng simultaneously had smallpox and, soon after that, measles. In 1833, while in Ohio, they had had malaria, chills attacking both simultaneously. They had earned their living by manufacturing cocoanut oil, raising ducks and catching fish. They claimed to be good swimmers and could row a boat very fast since they both pushed and pulled the oars at the same time. Because of the Civil War they had left the United States and had returned to Europe. Their lives were said to be exemplarily harmonious and co-operative. When they stood, they leaned against one another. Their replies to questions and their gestures were identical, lightning-like and synchronous. They never quarreled, and experienced happiness, excitement and anger in common; they fell asleep and awakened together. It had been said that their respirations and heart rates were synchronous, but Virchow observed, when one of them had exercised independently, that only his respiration and pulse increased in frequency. Both were becoming deaf, unfortunately one faster than the other, so that the homology of their actions sometimes failed when one of them did not hear what was said. Each could do and think as he pleased, and each experienced only the pain of his own body. There was, however, one place in which both could feel the same stimulus, and this was a zone about an inch in width that ran circularly round the attachment between the two.

May I venture the assertion, then, that Virchow was a great neuropsychiatrist and would have gone down in history as such had his other achievements not overshadowed these? Above all we must commend any man who can tell so many unusual things in such simple manner. This is always a sign of greatness.

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stance, in 1937 caused more deaths than any one of thirty-one infectious diseases, accounted for 11.4 per cent of all first admissions to mental hospitals in the United States during the year of 1938, and was responsible for one of every three fatal traffic accidents occurring at night, not to mention the economic loss associated with the problem drinker.

It was also shown that while the physician, especially the psychiatrist, can start the chronic alcoholic's restoration to health, full recovery or rehabilitation can be reached only through a modification of our social and economic scheme, which must arise from a process of public re-education.

Naturally, every physician is interested chiefly in the care and treatment of his alcoholic patients, but inadequate measures show that more research is necessary to determine curative procedures. To those who have encountered these difficulties associated with the management of the chronic alcoholic, a more important additional feature is presented. Alcohol or some substitute will always be available because our emotional make-up will demand an outlet, but just as with all major disorders in the field of medical science, prevention of over-indulgence remains the ultimate goal in this broad program.

T. H. H.